AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An electron emission element comprising a substrate, and a protrusion protruding from the substrate and including boron-doped diamond:

the protrusion comprising a columnar body;

a tip portion of the protrusion comprising an acicular body sticking out therefrom; and

the distance r [cm] between a center axis and a side face in the columnar body and the boron concentration Nb [cm^{-3}] in the diamond satisfying the relationship represented by the following formula (1):

$$r > \frac{10^4}{\sqrt{Nb}} \qquad (1),$$

wherein the distance r [cm] between the center axis and side face in the columnar body is 0.1 μm or less; and

wherein the boron concentration in the diamond is 5×10^{19} cm^{-3} or more.

Claim 2 (Canceled)

3. (Original) An electron emission element comprising a substrate, and a protrusion protruding from the substrate and including boron-doped diamond:

the protrusion comprising a columnar body;

a tip portion of the protrusion comprising an acicular body sticking out therefrom;

diamond crystal included in the tip portion of the protrusion being terminated with hydrogen; and

the distance r [cm] between a center axis and a side face in the columnar body and the boron concentration Nb [cm^{-3}] in the diamond satisfying the relationship represented by the following formula (2):

$$r > \frac{10^2}{\sqrt{Nb}} \qquad (2).$$

4. (Currently Amended) ~~The electron emission element according to claim 1,~~ An electron emission element comprising a substrate, and a protrusion protruding from the substrate and including boron-doped diamond:

the protrusion comprising a columnar body;

a tip portion of the protrusion comprising an acicular body sticking out therefrom; and

the distance r [cm] between a center axis and a side face in the columnar body and the boron concentration Nb [cm^{-3}] in the diamond satisfying the relationship represented by the following formula (1):

$$r > \frac{10^4}{\sqrt{Nb}} \qquad (1),$$

wherein the diamond is doped with nitrogen; and

wherein the boron concentration Nb [cm^{-3}] in the diamond is higher than the nitrogen concentration Nn [cm^{-3}] therein.

5. (Original) The electron emission element according to claim 4,

wherein the diamond is doped with nitrogen; and

wherein the boron concentration Nb [cm^{-3}] and nitrogen concentration Nn [cm^{-3}] in the diamond satisfy the relationship represented by the following formula (3):

$$Nb - Nn < 6 \times 10^{18} \qquad (3).$$

6. (Original) The electron emission element according to claim 1, wherein the protrusion protrudes from a (111) sector of a diamond formed by a high pressure-high temperature synthesis.

7. (Original) The electron emission element according to claim 3, wherein the protrusion protrudes from a (311) or (110) sector of a diamond formed by a high pressure-high temperature synthesis.

8. (Original) The electron emission element according to claim 1, wherein the substrate comprises a diamond formed by a vapor-phase synthesis.